



PATENT
Docket No. 381092000721

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

Express Mail Label No.: EV 143875698 US

Date of Deposit: January 13, 2003

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

Tami M. Procopio
Tami M. Procopio

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Terrance P. SNUTCH and
David L. BAILLIE

Serial No.: 09/611,257

Filing Date: 6 July 2000

For: MAMMALIAN T-TYPE CALCIUM
CHANNELS

Examiner: N. Basi

Group Art Unit: 1646

RECEIVED

JAN 21 2003

TECH CENTER 1600/2900

REQUEST FOR CORRECTION OF DRAWINGS

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Enclosed are six (6) substitute sheets of drawings for Figures 6A-6E and Figure 8 in connection with the above-identified application. In addition, please find enclosed drawings showing the proposed changes in red.

The Figures have been amended to be labeled separately, as required by 37 C.F.R. 1.84(u)(1), and to include sequence identification numbers which were not included at the time of filing. Applicants respectfully request the entry of these amendments.

In the unlikely event that the transmittal letter is separated from this request and the U.S. Patent Office determines that an extension and/or other relief is required, applicants petition for any required relief including extensions of time and authorize the Assistant Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing to our Deposit Account No. 03-1952. However, the Assistant Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: January 13, 2003

By:



Kate H. Murashige
Registration No. 29,959

Morrison & Foerster LLP
3811 Valley Centre Drive
Suite 500
San Diego, California 92130-2332
Telephone: (858) 720-5112
Facsimile: (858) 720-5125



Human $\alpha 1$ G T-type calcium channel cDNA

↓(SEQ ID NO:36)

1 aagcttgcttgccctctccggatcgcccgggggcccggtggccagagg ATG GAC GAG GAG GAG GAT GGA 71
1 (SEQ ID NO:37)→ M D E E E D G 7
72 GCG GGC GCC GAG GAG TCG GGA CAG CCC CGG AGC TTC ATG CGG CTC AAC GAC CTG TCG GGG 131
8 A G A E E S G Q P R S F M R L N D L S G 27
132 GCC GGG GGC CGG CCG GGG CCG GGG TCA GCA GAA AAG GAC CCG GGC AGC GCG GAC TCC GAG 191
28 A G G R P G P G S A E K D P G S A D S E 47
192 GCG GAG GGG CTG CCG TAC CCG GCG CTG GCC CCG GTG GTT TTC TTC TAC TTG AGC CAG GAC 251
48 A E G L P Y P A L A P V V F F Y L S Q D 67
252 AGC CGC CCG CGG AGC TGG TGT CTC CGC ACG GTC TGT AAC CCC TGG TTT GAG CGC ATC AGC 311
68 S R P R S W C L R T V C N P W F E R I S 87
312 ATG TTG GTC ATC CTT CTC AAC TGC GTG ACC CTG GGC ATG TTC CGG CCA TGC GAG GAC ATC 371
88 M L V I L L N C V T L G M F R P C E D I 107
372 GCC TGT GAC TCC CAG CGC TGC CGG ATC CTG CAG GCC TTT GAT GAC TTC ATC TTT GCC TTC 431
108 A C D S Q R C R I L Q A F D D F I F A F 127
432 TTT GCC GTG GAG ATG GTG GTG AAG ATG GTG GCC TTG GGC ATC TTT GGG AAA AAG TGT TAC 491
128 F A V E M V V K M V A L G I F G K K C Y 147
492 CTG GGA GAC ACT TGG AAC CGG CTT GAC TTT TTC ATC GTC ATC GCA GGG ATG CTG GAG TAC 551
148 L G D T W N R L D F F I V I A G M L E Y 167
552 TCG CTG GAC CTG CAG AAC GTC AGC TTC TCA GCT GTC AGG ACA GTC CGT GTG CTG CGA CCG 611
168 S L D L Q N V S F S A V R T V R V L R P 187
612 CTC AGG GCC ATT AAC CGG GTG CCC AGC ATG CGC ATC CTT GTC ACG TTG CTG CTG GAT ACG 671
188 L R A I N R V P S M R I L V T L L L D T 207
672 CTG CCC ATG CTG GGC AAC GTC CTG CTG CTC TGC TTC TTC GTC TTC TTC ATC TTC GGC ATC 731
208 L P M L G N V L L L C F F V F F I F G I 227
732 GTC GGC GTC CAG CTG TGG GCA GGG CTG CTT CGG AAC CGA TGC TTC CTA CCT GAG AAT TTC 791
228 V G V Q L W A G L L R N R C F L P E N F 247
792 AGC CTC CCC CTG AGC GTG GAC CTG GAG CGC TAT TAC CAG ACA GAG AAC GAG GAT GAG AGC 851
248 S L P L S V D L E R Y Y Q T E N E D E S 267
852 CCC TTC ATC TGC TCC CAG CCA CGC GAG AAC GGC ATG CGG TCC TGC AGA AGC GTG CCC ACG 911
268 P F I C S Q P R E N G M R S C R S V P T 287
912 CTG CGC GGG GAC GGG GGC GGT GGC CCA CCT TGC GGT CTG GAC TAT GAG GCC TAC AAC AGC 971
288 L R G D G G G G P P C G L D Y E A Y N S 307
972 TCC AGC AAC ACC ACC TGT GTC AAC TGG AAC CAG TAC TAC ACC AAC TGC TCA GCG GGG GAG 1031
308 S S N T T C V N W N Q Y Y T N C S A G E 327
1032 CAC AAC CCC TTC AAG GGC GCC ATC AAC TTT GAC AAC ATT GGC TAT GCC TGG ATC GCC ATC 1091
328 H N P F K G A I N F D N I G Y A W I A I 347
1092 TTC CAG GTC ATC ACG CTG GAG GGC TGG GTC GAC ATC ATG TAC TTT GTG ATG GAT GCT CAT 1151
348 F Q V I T L E G W V D I M Y F V M D A H 367
1152 TCC TTC TAC AAT TTC ATC TAC TTC ATC CTC CTC ATC ATC GTG GGC TCC TTC TTC ATG ATC 1211
368 S F Y N F I Y F I L L I I V G S F F M I 387
1212 AAC CTG TGC CTG GTG GTG ATT GCC ACG CAG TTC TCA GAG ACC AAG CAG CGG GAA AGC CAG 1271
388 N L C L V V I A T Q F S E T K Q R E S Q 407
1272 CTG ATG CGG GAG CAG CGT GTG CGG TTC CTG TCC AAC GCC AGC ACC CTG GCT AGC TTC TCT 1331
408 L M R E Q R V R F L S N A S T L A S F S 427
1332 GAG CCC GGC AGC TGC TAT GAG GAG CTG CTC AAG TAC CTG GTG TAC ATC CTT CGT AAG GCA 1391
428 E P G S C Y E E L L K Y L V Y I L R K A 447

FIG. 6A



1392	GCC	CGC	AGG	CTG	GCT	CAG	GTC	TCT	CGG	GCA	GCA	GGT	GTG	CGG	GTT	GGG	CTG	CTC	AGC	AGC	1451
448	A	R	R	L	A	Q	V	S	R	A	A	G	V	R	V	G	L	L	S	S	467
1452	CCA	GCA	CCC	CTC	GGG	GGC	CAG	GAG	ACC	CAG	CCC	AGC	AGC	AGC	TGC	TCT	CGC	TCC	CAC	CGC	1511
468	P	A	P	L	G	G	Q	E	T	Q	P	S	S	S	C	S	R	S	H	R	487
1512	CGC	CTA	TCC	GTC	CAC	CAC	CTG	GTG	CAC	CAC	CAC	CAC	CAC	CAT	CAC	CAC	CAC	TAC	CAC	CTG	1571
488	R	L	S	V	H	H	L	V	H	H	H	H	H	H	H	H	H	Y	H	L	507
1572	GGC	AAT	GGG	ACG	CTC	AGG	GCC	CCC	CGG	GCC	AGC	CCG	GAG	ATC	CAG	GAC	AGG	GAT	GCC	AAT	1631
508	G	N	G	T	L	R	A	P	R	A	S	P	E	I	Q	D	R	D	A	N	527
1632	GGG	TCC	CGC	AGG	CTC	ATG	CTG	CCA	CCA	CCC	TCG	ACG	CCT	GCC	CTC	TCC	GGG	GCC	CCC	CCT	1691
528	G	S	R	R	L	M	L	P	P	P	S	T	P	A	L	S	G	A	P	P	547
1692	GGT	GGC	GCA	GAG	TCT	GTG	CAC	AGC	TTC	TAC	CAT	GCC	GAC	TGC	CAC	TTA	GAG	CCA	GTC	CGC	1751
548	G	G	A	E	S	V	H	S	F	Y	H	A	D	C	H	L	E	P	V	R	567
1752	TGC	CAG	GCG	CCC	CCT	CCC	AGG	TCC	CCA	TCT	GAG	GCA	TCC	GGC	AGG	ACT	GTG	GGC	AGC	GGG	1811
568	C	Q	A	P	P	P	R	S	P	S	E	A	S	G	R	T	V	G	S	G	587
1812	AAG	GTG	TAT	CCC	ACC	GTG	CAC	ACC	AGC	CCT	CCA	CCG	GAG	ACG	CTG	AAG	GAG	AAG	GCA	CTA	1871
588	K	V	Y	P	T	V	H	T	S	P	P	P	E	T	L	K	E	K	A	L	607
1872	GTA	GAG	GTG	GCT	GCC	AGC	TCT	GGG	CCC	CCA	ACC	CTC	ACC	AGC	CTC	AAC	ATC	CCA	CCC	GGG	1931
608	V	E	V	A	A	S	S	G	P	P	T	L	T	S	L	N	I	P	P	G	627
1932	CCC	TAC	AGC	TCC	ATG	CAC	AAG	CTG	CTG	GAG	ACA	CAG	AGT	ACA	GGT	GCC	TGC	CAA	AGC	TCT	1991
628	P	Y	S	S	M	H	K	L	L	E	T	Q	S	T	G	A	C	Q	S	S	647
1992	TGC	AAG	ATC	TCC	AGC	CCT	TGC	TTG	AAA	GCA	GAC	AGT	GGA	GCC	TGT	GGT	CCA	GAC	AGC	TGC	2051
648	C	K	I	S	S	P	C	L	K	A	D	S	G	A	C	G	P	D	S	C	667
2052	CCC	TAC	TGT	GCC	CGG	GCC	GGG	GCA	GGG	GAG	GTG	GAG	CTC	GCC	GAC	CGT	GAA	ATG	CCT	GAC	2111
668	P	Y	C	A	R	A	G	A	G	E	V	E	L	A	D	R	E	M	P	D	687
2112	TCA	GAC	AGC	GAG	GCA	GTT	TAT	GAG	TTC	ACA	CAG	GAT	GCC	CAG	CAC	AGC	GAC	CTC	CGG	GAC	2171
688	S	D	S	E	A	V	Y	E	F	T	Q	D	A	Q	H	S	D	L	R	D	707
2172	CCC	CAC	AGC	CGG	CGG	CAA	CGG	AGC	CTG	GGC	CCA	GAT	GCA	GAG	CCC	AGC	TCT	GTG	CTG	GCC	2231
708	P	H	S	R	R	Q	R	S	L	G	P	D	A	E	P	S	S	V	L	A	727
2232	TTC	TGG	AGG	CTA	ATC	TGT	GAC	ACC	TTC	CGA	AAG	ATT	GTG	GAC	AGC	AAG	TAC	TTT	GGC	CGG	2291
728	F	W	R	L	I	C	D	T	F	R	K	I	V	D	S	K	Y	F	G	R	747
2292	GGA	ATC	ATG	ATC	GCC	ATC	CTG	GTC	AAC	ACA	CTC	AGC	ATG	GGC	ATC	GAA	TAC	CAC	GAG	CAG	2351
748	G	I	M	I	A	I	L	V	N	T	L	S	M	G	I	E	Y	H	E	Q	767
2352	CCC	GAG	GAG	CTT	ACC	AAC	GCC	CTA	GAA	ATC	AGC	AAC	ATC	GTC	TTC	ACC	AGC	CTC	TTT	GCC	2411
768	P	E	E	L	T	N	A	L	E	I	S	N	I	V	F	T	S	L	F	A	787
2412	CTG	GAG	ATG	CTG	CTG	AAG	CTG	CTT	GTG	TAT	GGT	CCC	TTT	GGC	TAC	ATC	AAG	AAT	CCC	TAC	2471
788	L	E	M	L	L	K	L	L	V	Y	G	P	F	G	Y	I	K	N	P	Y	807
2472	AAC	ATC	TTC	GAT	GGT	GTC	ATT	GTG	GTC	ATC	AGC	GTG	TGG	GAG	ATC	GTG	GGC	CAG	CAG	GGG	2531
808	N	I	F	D	G	V	I	V	V	I	S	V	W	E	I	V	G	Q	Q	G	827
2532	GGC	GGC	CTG	TCG	GTG	CTG	CGG	ACC	TTC	CGC	CTG	ATG	CGT	GTG	CTG	AAG	CTG	GTG	CGC	TTC	2591
828	G	G	L	S	V	L	R	T	F	R	L	M	R	V	L	K	L	V	R	F	847
2592	CTG	CCG	GCG	CTG	CAG	CGG	CAG	CTG	GTG	GTG	CTC	ATG	AAG	ACC	ATG	GAC	AAC	GTG	GCC	ACC	2651
848	L	P	A	L	Q	R	Q	L	V	V	L	M	K	T	M	D	N	V	A	T	867
2652	TTC	TGC	ATG	CTG	CTT	ATG	CTC	TTC	ATC	TTC	ATC	TTC	AGC	ATC	CTG	GGC	ATG	CAT	CTC	TTC	2711
868	F	C	M	L	L	M	L	F	I	F	I	F	S	I	L	G	M	H	L	F	887
2712	GGC	TGC	AAG	TTT	GCC	TCT	GAG	CGG	GAT	GGG	GAC	ACC	CTG	CCA	GAC	CGG	AAG	AAT	TTT	GAC	2771
888	G	C	K	F	A	S	E	R	D	G	D	T	L	P	D	R	K	N	F	D	907
2772	TCC	TTG	CTC	TGG	GCC	ATC	GTC	ACT	GTC	TTT	CAG	ATC	CTG	ACC	CAG	GAG	GAC	TGG	AAC	AAA	2831
908	S	L	L	W	A	I	V	T	V	F	Q	I	L	T	Q	E	D	W	N	K	927
2832	GTC	CTC	TAC	AAT	GGT	ATG	GCC	TCC	ACG	TCG	TCC	TGG	GCG	GCC	CTT	TAT	TTC	ATT	GCC	CTC	2891
928	V	L	Y	N	G	M	A	S	T	S	S	W	A	A	L	Y	F	I	A	L	947
2892	ATG	ACC	TTC	GGC	AAC	TAC	GTG	CTC	TTC	AAT	TTG	CTG	GTC	GCC	ATT	CTG	GTG	GAG	GGC	TTC	2951

FIG. 6B



948 M T F G N Y V L F N L L V A I L V E G F 967
2952 CAG GCG GAG GAA ATC AGC AAA CGG GAA GAT GCG AGT GGA CAG TTA AGC TGT ATT CAG CTG 3011
968 Q A E E I S K R E D A S G Q L S C I Q L 987
3012 CCT GTC GAC TCC CAG GGG GGA GAT GCC AAC AAG TCC GAA TCA GAG CCC GAT TTC TTC TCA 3071
988 P V D S Q G G D A N K S E S E P D F F S 1007
3072 CCC AGC CTG GAT GGT GAT GGG GAC AGG AAG AAG TGC TTG GCC TTG GTG TCC CTG GGA GAG 3131
1008 P S L D G D G D R K K C L A L V S L G E 1027
3132 CAC CCG GAG CTG CGG AAG AGC CTG CTG CCG CCT CTC ATC ATC CAC ACG GCC GCC ACA CCC 3191
1028 H P E L R K S L L P P L I I H T A A T P 1047
3192 ATG TCG CTG CCC AAG AGC ACC AGC ACG GGC CTG GGC GAG GCG CTG GGC CCT GCG TCG CGC 3251
1048 M S L P K S T S T G L G E A L G P A S R 1067
3252 CGC ACC AGC AGC AGC GGG TCG GCA GAG CCT GGG GCG GCC CAC GAG ATG AAG TCA CCG CCC 3311
1068 R T S S S G S A E P G A A H E M K S P P 1087
3312 AGC GCC CGC AGC TCT CCG CAC AGC CCC TGG AGC GCT GCA AGC AGC TGG ACC AGC AGG CGC 3371
1088 S A R S S P H S P W S A A S S W T S R R 1107
3372 TCC AGC CGG AAC AGC CTC GGC CGT GCA CCC AGC CTG AAG CGG AGA AGC CCA AGT GGA GAG 3431
1108 S S R N S L G R A P S L K R R S P S G E 1127
3432 CGG CGG TCC CTG TTG TCG GGA GAA GGC CAG GAG AGC CAG GAT GAA GAG GAG AGC TCA GAA 3491
1128 R R S L L S G E G Q E S Q D E E S S E 1147
3492 GAG GAG CGG GCC AGC CCT GCG GGC AGT GAC CAT CGC CAC AGG GGG TCC CTG GAG CGG GAG 3551
1148 E E R A S P A G S D H R H R G S L E R E 1167
3552 GCC AAG AGT TCC TTT GAC CTG CCA GAC ACA CTG CAG GTG CCA GGG CTG CAT CGC ACT GCC 3611
1168 A K S S F D L P D T L Q V P G L H R T A 1187
3612 AGT GGC CGA GGG TCT GCT TCT GAG CAC CAG GAC TGC AAT GGC AAG TCG GCT TCA GGG CGC 3671
1188 S G R G S A S E H Q D C N G K S A S G R 1207
3672 CTG GCC CGG GCC CTG CGG CCT GAT GAC CCC CCA CTG GAT GGG GAT GAC GCC GAT GAC GAG 3731
1208 L A R A L R P D D P P L D G D D A D D E 1227
3732 GGC AAC CTG AGC AAA GGG GAA CGG GTC CGC GCG TGG ATC CGA GCC CGA CTC CCT GCC TGC 3791
1228 G N L S K G E R V R A W I R A R L P A C 1247
3792 TAC CTC GAG CGA GAC TCC TGG TCA GCC TAC ATC TTC CCT CCT CAG TCC AGG TTC CGC CTC 3851
1248 Y L E R D S W S A Y I F P P Q S R F R L 1267
3852 CTG TGT CAC CGG ATC ATC ACC CAC AAG ATG TTC GAC CAC GTG GTC CTT GTC ATC ATC TTC 3911
1268 L C H R I I T H K M F D H V V L V I I F 1287
3912 CTT AAC TGC ATC ACC ATC GCC ATG GAG CGC CCC AAA ATT GAC CCC CAC AGC GCT GAA CGC 3971
1288 L N C I T I A M E R P K I D P H S A E R 1307
3972 ATC TTC CTG ACC CTC TCC AAT TAC ATC TTC ACC GCA GTC TTT CTG GCT GAA ATG ACA GTG 4031
1308 I F L T L S N Y I F T A V F L A E M T V 1327
4032 AAG GTG GTG GCA CTG GGC TGG TGC TTC GGG GAG CAG GCG TAC CTG CGG AGC AGT TGG AAC 4091
1328 K V V A L G W C F G E Q A Y L R S S W N 1347
4092 GTG CTG GAC GGG CTG TTG GTG CTC ATC TCC GTC ATC GAC ATT CTG GTG TCC ATG GTC TCT 4151
1348 V L D G L L V L I S V I D I L V S M V S 1367
4152 GAC AGC GGC ACC AAG ATC CTG GGC ATG CTG AGG GTG CTG CGG CTG CTG CGG ACC CTG CGC 4211
1368 D S G T K I L G M L R V L R L L R T L R 1387
4212 CCG CTC AGG GTG ATC AGC CGG GCG CAG GGG CTG AAG CTG GTG GTG GAG ACG CTG ATG TCC 4271
1388 P L R V I S R A Q G L K L V V E T L M S 1407
4272 TCA CTG AAA CCC ATC GGC AAC ATT GTA GTC ATC TGC TGT GCC TTC TTC ATC ATT TTC GGC 4331
1408 S L K P I G N I V V I C C A F F I I F G 1427
4332 ATC TTG GGG GTG CAG CTC TTC AAA GGG AAG TTT TTC GTG TGC CAG GGC GAG GAT ACC AGG 4391
1428 I L G V Q L F K G K F F V C Q G E D T R 1447
4392 AAC ATC ACC AAT AAA TCG GAC TGT GCC GAG GCC AGT TAC CGG TGG GTC CGG CAC AAG TAC 4451
1448 N I T N K S D C A E A S Y R W V R H K Y 1467

FIG. 6C



4452 AAC TTT GAC AAC CTT GGC CAG GCC CTG ATG TCC CTG TTC GTT TTG GCC TCC AAG GAT GGT 4511
1468 N F D N L G Q A L M S L F V L A S K D G 1487

4512 TGG GTG GAC ATC ATG TAC GAT GGG CTG GAT GCT GTG GGC GTG GAC CAG CAG CCC ATC ATG 4571
1489 W V D I M Y D G L D A V G V D Q Q P I M 1507

4572 AAC CAC AAC CCC TGG ATG CTG CTG TAC TTC ATC TCG TTC CTG CTC ATT GTG GCC TTC TTT 4631
1508 N H N P W M L L Y F I S F L L I V A F F 1527

4632 GTC CTG AAC ATG TTT GTG GGT GTG GTG GTG GAG AAC TTC CAC AAG TGT AGG CAG CAC CAG 4691
1528 V L N M F V G V V V E N F H K C R Q H Q 1547

4692 GAG GAA GAG GAG GCC CGG CGG CGG GAG GAG AAG CGC CTA CGA AGA CTG GAG AAA AAG AGA 4751
1549 E E E E A R R R E E K R L R R L E K K R 1567

4752 AGG AAA GCC CAG TGC AAA CCT TAC TAC TCC GAC TAC TCC CGC TTC CGG CTC CTC GTC CAC 4811
1568 R K A Q C K P Y Y S D Y S R F R L L V H 1587

4812 CAC TTG TGC ACC AGC CAC TAC CTG GAC CTC TTC ATC ACA GGT GTC ATC GGG CTG AAC GTG 4871
1588 H L C T S H Y L D L F I T G V I G L N V 1607

4872 GTC ACC ATG GCC ATG GAG CAC TAC CAG CAG CCC CAG ATT CTG GAT GAG GCT CTG AAG ATC 4931
1608 V T M A M E H Y Q Q P Q I L D E A L K I 1627

4932 TGC AAC TAC ATC TTC ACT GTC ATC TTT GTC TTG GAG TCA GTT TTC AAA CTT GTG GCC TTT 4991
1628 C N Y I F T V I F V L E S V F K L V A F 1647

4992 GGT TTC CGT CGG TTC TTC CAG GAC AGG TGG AAC CAG CTG GAC CTG GCC ATT GTG CTG CTG 5051
1648 G F R R F F Q D R W N Q L D L A I V L L 1667

5052 TCC ATC ATG GGC ATC ACG CTG GAG GAA ATC GAG GTC AAC GCC TCG CTG CCC ATC AAC CCC 5111
1668 S I M G I T L E E I E V N A S L P I N P 1687

5112 ACC ATC ATC CGC ATC ATG AGG GTG CTG CGC ATT GCC CGA GTG CTG AAG CTG CTG AAG ATG 5171
1688 T I I R I M R V L R I A R V L K L L K M 1707

5172 GCT GTG GGC ATG CGG GCG CTG CTG GAC ACG GTG ATG CAG GCC CTG CCC CAG GTG GGG AAC 5231
1708 A V G M R A L L D T V M Q A L P Q V G N 1727

5232 CTG GGA CTT CTC TTC ATG TTG TTG TTT TTC ATC TTT GCA GCT CTG GGC GTG GAG CTC TTT 5291
1728 L G L L F M L L F F I F A A L G V E L F 1747

5292 GGA GAC CTG GAG TGT GAC GAG ACA CAC CCC TGT GAG GGC CTG GGC CGT CAT GCC ACC TTT 5351
1748 G D L E C D E T H P C E G L G R H A T F 1767

5352 CGG AAC TTT GGC ATG GCC TTC CTA ACC CTC TTC CGA GTC TCC ACA GGT GAC AAT TGG AAT 5411
1768 R N F G M A F L T L F R V S T G D N W N 1787

5412 GGC ATT ATG AAG GAC ACC CTC CGG GAC TGT GAC CAG GAG TCC ACC TGC TAC AAC ACG GTC 5471
1788 G I M K D T L R D C D Q E S T C Y N T V 1807

5472 ATC TCG CCT ATC TAC TTT GTG TCC TTC GTG CTG ACG GCC CAG TTC GTG CTA GTC AAC GTG 5531
1808 I S P I Y F V S F V L T A Q F V L V N V 1827

5532 GTG ATC GCC GTG CTG ATG AAG CAC CTG GAG GAG AGC AAC AAG GAG GCC AAG GAG GAG GCC 5591
1828 V I A V L M K H L E E S N K E A K E E A 1847

5592 GAG CTA GAG GCT GAG CTG GAG CTG GAG ATG AAG ACC CTC AGC CCC CAG CCC CAC TCG CCA 5651
1848 E L E A E L E L E M K T L S P Q P H S P 1867

5652 CTG GGC AGC CCC TTC CTC TGG CCT GGG GTC GAG GGC CCC GAC AGC CCC GAC AGC CCC AAG 5711
1868 L G S P F L W P G V E G P D S P D S P K 1887

5712 CCT GGG GCT CTG CAC CCA GCG GCC CAC GCG AGA TCA GCC TCC CAC TTT TCC CTG GAG CAC 5771
1888 P G A L H P A A H A R S A S H F S L E H 1907

5772 CCC ACG ATG CAG CCC CAC CCC ACG GAG CTG CCA GGA CCA GAC TTA CTG ACT GTG CGG AAG 5831
1908 P T M Q P H P T E L P G P D L L T V R K 1927

5832 TCT GGG GTC AGC CGA ACG CAC TCT CTG CCC AAT GAC AGC TAC ATG TGT CGG CAT GGG AGC 5891
1928 S G V S R T H S L P N D S Y M C R H G S 1947

5892 ACT GCC GAG GGG CCC CTG GGA CAC AGG GGC TGG GGG CTC CCC AAA GCT CAG TCA GGC TCC 5951
1948 T A E G P L G H R G W G L P K A Q S G S 1967

FIG. 6D



5952 GTC TTG TCC GTT CAC TCC CAG CCA GCA GAT ACC AGC TAC ATC CTG CAG CTT CCC AAA GAT 6011
1968 V L S V H S Q P A D T S Y I L Q L P K D 1987

6012 GCA CCT CAT CTG CTC CAG CCC CAC AGC GCC CCA ACC TGG GGC ACC ATC CCC AAA CTG CCC 6071
1988 A P H L L Q P H S A P T W G T I P K L P 2007

6072 CCA CCA GGA CGC TCC CCT TTG GCT CAG AGG CCA CTC AGG CGC CAG GCA GCA ATA AGG ACT 6131
2008 P P G R S P L A Q R P L R R Q A A I R T 2027

6132 GAC TCC TTG GAC GTT CAG GGT CTG GGC AGC CGG GAA GAC CTG CTG GCA GAG GTG AGT GGG 6191
2028 D S L D V Q G L G S R E D L L A E V S G 2047

6192 CCC TCC CCG CCC CTG GCC CGG GCC TAC TCT TTC TGG GGC CAG TCA AGT ACC CAG GCA CAG 6251
2048 P S P P L A R A Y S F W G Q S S T Q A Q 2067

6252 CAG CAC TCC CGC AGC CAC AGC AAG ATC TCC AAG CAC ATG ACC CCG CCA GCC CCT TGC CCA 6311
2068 Q H S R S H S K I S K H M T P P A P C P 2087

6312 GGC CCA GAA CCC AAC TGG GGC AAG GGC CCT CCA GAG ACC AGA AGC AGC TTA GAG TTG GAC 6371
2088 G P E P N W G K G P P E T R S S L E L D 2107

6372 ACG GAG CTG AGC TGG ATT TCA GGA GAC CTC CTG CCC CCT GGC GGC CAG GAG GAG CCC CCA 6431
2108 T E L S W I S G D L L P P G G Q E E P P 2127

6432 TCC CCA CGG GAC CTG AAG AAG TGC TAC AGC GTG GAG GCC CAG AGC TGC CAG CGC CGG CCT 6491
2128 S P R D L K K C Y S V E A Q S C Q R R P 2147

6492 ACG TCC TGG CTG GAT GAG CAG AGG AGA CAC TCT ATC GCC GTC AGC TGC CTG GAC AGC GGC 6551
2148 T S W L D E Q R R H S I A V S C L D S G 2167

6552 TCC CAA CCC CAC CTG GGC ACA GAC CCC TCT AAC CTT GGG GGC CAG CCT CTT GGG GGG CCT 6611
2168 S Q P H L G T D P S N L G G Q P L G G P 2187

6612 GGG AGC CGG CCC AAG AAA AAA CTC AGC CCG CCT AGT ATC ACC ATA GAC CCC CCC GAG AGC 6671
2188 G S R P K K K L S P P S I T I D P P E S 2207

6672 CAA GGT CCT CGG ACC CCG CCC AGC CCT GGT ATC TGC CTC CGG AGG AGG GCT CCG TCC AGC 6731
2208 Q G P R T P P S P G I C L R R R A P S S 2227

6732 GAC TCC AAG GAT CCC TTG GCC TCT GGC CCC CCT GAC AGC ATG GCT GCC TCG CCC TCC CCA 6791
2228 D S K D P L A S G P P D S M A A S P S P 2247

6792 AAG AAA GAT GTG CTG AGT CTC TCC GGT TTA TCC TCT GAC CCA GCA GAC CTG GAC CCC TGA 6851
2248 K K D V L S L S G L S S D P A D L D P * 2267

6852 gtccctgccccactttcccaactcaccctttctccactgggtgc 6892

FIG. 6E



COMPARISON OF P-REGIONS

I	II	III	IV	
LAASE E GWVYV	QITIQ E GWTFE	ETLSF K GWNVI	RCLTG E DVNDI (SEQ ID NO:38)	NIC-1 (C11D2.6)
LAASQ E GWVYV	QITIQ E GWTDV	ETLSY K GWNV	RSVTG E DVNDI (SEQ ID NO:39)	NIC-2 (C27F2.3)
EASSQ E GWVFL	QILTQ E GWVDV	EVLST K GWVEV	RIVTG E DVNKI (SEQ ID NO:40)	Rat-NIC
QCITM E GWTDV	QILTG E DVNSV	TVSTF E GWPEL	RCATG E AWQDI (SEQ ID NO:41)	L-Type Ca Channel
QVITL E GWVDI	QILTQ E DWNKV	VLASK D GWVDI	RVSTG D NWNGI (SEQ ID NO:42)	T-Type Ca Channel
RLMTQ D FWEVL	RVLCG E WIETM	QVATF K GWMOI	QITTS A GWDGL (SEQ ID NO:43)	Na Channels

Fig. 8



Human $\alpha 1$ G T-type calcium channel cDNA

(SEQ ID NO: 34)
1 aagcttgcttgccctctccggatcgcccggggccccggctggccagagg ATG GAC GAG GAG GAG GAT GGA 71
1 (SEQ ID NO: 37) → M D E E E D G 7

72 GCG GGC GCC GAG GAG TCG GGA CAG CCC CGG AGC TTC ATG CGG CTC AAC GAC CTG TCG GGG 131
8 A G A E E S G Q P R S F M R L N D L S G 27

132 GCC GGG GGC CGG CCG GGG CCG GGG TCA GCA GAA AAG GAC CCG GGC AGC GCG GAC TCC GAG 191
28 A G G R P G P G S A E K D P G S A D S E 47

192 GCG GAG GGG CTG CCG TAC CCG GCG CTG GCC CCG GTG GTT TTC TTC TAC TTG AGC CAG GAC 251
48 A E G L P Y P A L A P V V F F Y L S Q D 67

252 AGC CGC CCG CGG AGC TGG TGT CTC CGC ACG GTC TGT AAC CCC TGG TTT GAG CGC ATC AGC 311
68 S R P R S W C L R T V C N P W F E R I S 87

312 ATG TTG GTC ATC CTT CTC AAC TGC GTG ACC CTG GGC ATG TTC CGG CCA TGC GAG GAC ATC 371
88 M L V I L L N C V T L G M F R P C E D I 107

372 GCC TGT GAC TCC CAG CGC TGC CGG ATC CTG CAG GCC TTT GAT GAC TTC ATC TTT GCC TTC 431
108 A C D S Q R C R I L Q A F D D F I F A F 127

432 TTT GCC GTG GAG ATG GTG GTG AAG ATG GTG GCC TTG GGC ATC TTT GGG AAA AAG TGT TAC 491
128 F A V E M V V K M V A L G I F G K K C Y 147

492 CTG GGA GAC ACT TGG AAC CGG CTT GAC TTT TTC ATC GTC ATC GCA GGG ATG CTG GAG TAC 551
148 L G D T W N R L D F F I V I A G M L E Y 167

552 TCG CTG GAC CTG CAG AAC GTC AGC TTC TCA GCT GTC AGG ACA GTC CGT GTG CTG CGA CCG 611
168 S L D L Q N V S F S A V R T V R V L R P 187

612 CTC AGG GCC ATT AAC CGG GTG CCC AGC ATG CGC ATC CTT GTC ACG TTG CTG CTG GAT ACG 671
188 L R A I N R V P S M R I L V T L L L D T 207

672 CTG CCC ATG CTG GGC AAC GTC CTG CTG CTC TGC TTC TTC GTC TTC ATC TTC GGC ATC 731
208 L P M L G N V L L L C F F V F F I F G I 227

732 GTC GGC GTC CAG CTG TGG GCA GGG CTG CTT CGG AAC CGA TGC TTC CTA CCT GAG AAT TTC 791
228 V G V Q L W A G L L R N R C F L P E N F 247

792 AGC CTC CCC CTG AGC GTG GAC CTG GAG CGC TAT TAC CAG ACA GAG AAC GAG GAT GAG AGC 851
248 S L P L S V D L E R Y Y Q T E N E D E S 267

852 CCC TTC ATC TGC TCC CAG CCA CGC GAG AAC GGC ATG CGG TCC TGC AGA AGC GTG CCC ACG 911
268 P F I C S Q P R E N G M R S C R S V P T 287

912 CTG CGC GGG GAC GGG GGC GGT GGC CCA CCT TGC GGT CTG GAC TAT GAG GCC TAC AAC AGC 971
288 L R G D G G G G P P C G L D Y E A Y N S 307

972 TCC AGC AAC ACC ACC TGT GTC AAC TGG AAC CAG TAC TAC ACC AAC TGC TCA GCG GGG GAG 1031
308 S S N T T C V N W N Q Y Y T N C S A G E 327

1032 CAC AAC CCC TTC AAG GGC GCC ATC AAC TTT GAC AAC ATT GGC TAT GCC TGG ATC GCC ATC 1091
328 H N P F K G A I N F D N I G Y A W I A I 347

1092 TTC CAG GTC ATC ACG CTG GAG GGC TGG GTC GAC ATC ATG TAC TTT GTG ATG GAT GCT CAT 1151
348 F Q V I T L E G W V D I M Y F V M D A H 367

1152 TCC TTC TAC AAT TTC ATC TAC TTC ATC CTC CTC ATC ATC GTG GGC TCC TTC TTC ATG ATC 1211
368 S F Y N F I Y F I L L I I V G S F F M I 387

1212 AAC CTG TGC CTG GTG GTG ATT GCC ACG CAG TTC TCA GAG ACC AAG CAG CGG GAA AGC CAG 1271
388 N L C L V V I A T Q F S E T K Q R E S Q 407

1272 CTG ATG CGG GAG CAG CGT GTG CGG TTC CTG TCC AAC GCC AGC ACC CTG GCT AGC TTC TCT 1331
408 L M R E Q R V R F L S N A S T L A S F S 427

1332 GAG CCC GGC AGC TGC TAT GAG GAG CTG CTC AAG TAC CTG GTG TAC ATC CTT CGT AAG GCA 1391
428 E P G S C Y E E L L K Y L V Y I L R K A 447

Figure 6A



1392	GCC	CGC	AGG	CTG	GCT	CAG	GTC	TCT	CGG	GCA	GCA	GGT	GTG	CGG	GTT	GGG	CTG	CTC	AGC	AGC	1451
448	A	R	R	L	A	Q	V	S	R	A	A	G	V	R	V	G	L	L	S	S	467
1452	CCA	GCA	CCC	CTC	GGG	GGC	CAG	GAG	ACC	CAG	CCC	AGC	AGC	AGC	TGC	TCT	CGC	TCC	CAC	CGC	1511
468	P	A	P	L	G	G	Q	E	T	Q	P	S	S	S	C	S	R	S	H	R	487
1512	CGC	CTA	TCC	GTC	CAC	CAC	CTG	GTG	CAC	CAC	CAC	CAC	CAC	CAT	CAC	CAC	CAC	TAC	CAC	CTG	1571
488	R	L	S	V	H	H	L	V	H	H	H	H	H	H	H	H	H	Y	H	L	507
1572	GGC	AAT	GGG	ACG	CTC	AGG	GCC	CCC	CGG	GCC	AGC	CCG	GAG	ATC	CAG	GAC	AGG	GAT	GCC	AAT	1631
508	G	N	G	T	L	R	A	P	R	A	S	P	E	I	Q	D	R	D	A	N	527
1632	GGG	TCC	CGC	AGG	CTC	ATG	CTG	CCA	CCA	CCC	TCG	ACG	CCT	GCC	CTC	TCC	GGG	GCC	CCC	CCT	1691
528	G	S	R	R	L	M	L	P	P	P	S	T	P	A	L	S	G	A	P	P	547
1692	GGT	GGC	GCA	GAG	TCT	GTG	CAC	AGC	TTC	TAC	CAT	GCC	GAC	TGC	CAC	TTA	GAG	CCA	GTC	CGC	1751
548	G	G	A	E	S	V	H	S	F	Y	H	A	D	C	H	L	E	P	V	R	567
1752	TGC	CAG	GCG	CCC	CCT	CCC	AGG	TCC	CCA	TCT	GAG	GCA	TCC	GGC	AGG	ACT	GTG	GGC	AGC	GGG	1811
568	C	Q	A	P	P	R	S	P	S	E	A	S	G	R	T	V	G	S	G		587
1812	AAG	GTG	TAT	CCC	ACC	GTG	CAC	ACC	AGC	CCT	CCA	CCG	GAG	ACG	CTG	AAG	GAG	AAG	GCA	CTA	1871
588	K	V	Y	P	T	V	H	T	S	P	P	P	E	T	L	K	E	K	A	L	607
1872	GTA	GAG	GTG	GCT	GCC	AGC	TCT	GGG	CCC	CCA	ACC	CTC	ACC	AGC	CTC	AAC	ATC	CCA	CCC	GGG	1931
608	V	E	V	A	A	S	S	G	P	P	T	L	T	S	L	N	I	P	P	G	627
1932	CCC	TAC	AGC	TCC	ATG	CAC	AAG	CTG	CTG	GAG	ACA	CAG	AGT	ACA	GGT	GCC	TGC	CAA	AGC	TCT	1991
628	P	Y	S	S	M	H	K	L	L	E	T	Q	S	T	G	A	C	Q	S	S	647
1992	TGC	AAG	ATC	TCC	AGC	CCT	TGC	TTG	AAA	GCA	GAC	AGT	GGA	GCC	TGT	GGT	CCA	GAC	AGC	TGC	2051
648	C	K	I	S	S	P	C	L	K	A	D	S	G	A	C	G	P	D	S	C	667
2052	CCC	TAC	TGT	GCC	CGG	GCC	GGG	GCA	GGG	GAG	GTG	GAG	CTC	GCC	GAC	CGT	GAA	ATG	CCT	GAC	2111
668	P	Y	C	A	R	A	G	A	G	E	V	E	L	A	D	R	E	M	P	D	687
2112	TCA	GAC	AGC	GAG	GCA	GTT	TAT	GAG	TTC	ACA	CAG	GAT	GCC	CAG	CAC	AGC	GAC	CTC	CGG	GAC	2171
688	S	D	S	E	A	V	Y	E	F	T	Q	D	A	Q	H	S	D	L	R	D	707
2172	CCC	CAC	AGC	CGG	CGG	CAA	CGG	AGC	CTG	GGC	CCA	GAT	GCA	GAG	CCC	AGC	TCT	GTG	CTG	GCC	2231
708	P	H	S	R	R	Q	R	S	L	G	P	D	A	E	P	S	S	V	L	A	727
2232	TTC	TGG	AGG	CTA	ATC	TGT	GAC	ACC	TTC	CGA	AAG	ATT	GTG	GAC	AGC	AAG	TAC	TTT	GGC	CGG	2291
728	F	W	R	L	I	C	D	T	F	R	K	I	V	D	S	K	Y	F	G	R	747
2292	GGA	ATC	ATG	ATC	GCC	ATC	CTG	GTC	AAC	ACA	CTC	AGC	ATG	GGC	ATC	GAA	TAC	CAC	GAG	CAG	2351
748	G	I	M	I	A	I	L	V	N	T	L	S	M	G	I	E	Y	H	E	Q	767
2352	CCC	GAG	GAG	CTT	ACC	AAC	GCC	CTA	GAA	ATC	AGC	AAC	ATC	GTC	TTC	ACC	AGC	CTC	TTT	GCC	2411
768	P	E	E	L	T	N	A	L	E	I	S	N	I	V	F	T	S	L	F	A	787
2412	CTG	GAG	ATG	CTG	CTG	AAG	CTG	CTT	GTG	TAT	GGT	CCC	TTT	GGC	TAC	ATC	AAG	AAT	CCC	TAC	2471
788	L	E	M	L	L	K	L	L	V	Y	G	P	F	G	Y	I	K	N	P	Y	807
2472	AAC	ATC	TTC	GAT	GGT	GTC	ATT	GTG	GTC	ATC	AGC	GTG	TGG	GAG	ATC	GTG	GGC	CAG	CAG	GGG	2531
808	N	I	F	D	G	V	I	V	V	I	S	V	W	E	I	V	G	Q	Q	G	827
2532	GGC	GGC	CTG	TCG	GTG	CTG	CGG	ACC	TTC	CGC	CTG	ATG	CGT	GTG	CTG	AAG	CTG	GTG	CGC	TTC	2591
828	G	G	L	S	V	L	R	T	F	R	L	M	R	V	L	K	L	V	R	F	847
2592	CTG	CCG	GCG	CTG	CAG	CGG	CAG	CTG	GTG	GTG	CTC	ATG	AAG	ACC	ATG	GAC	AAC	GTG	GCC	ACC	2651
848	L	P	A	L	Q	R	Q	L	V	V	L	M	K	T	M	D	N	V	A	T	867
2652	TTC	TGC	ATG	CTG	CTT	ATG	CTC	TTC	ATC	TTC	ATC	TTC	AGC	ATC	CTG	GGC	ATG	CAT	CTC	TTC	2711
868	F	C	M	L	L	M	L	F	I	F	I	F	S	I	L	G	M	H	L	F	887
2712	GGC	TGC	AAG	TTT	GCC	TCT	GAG	CGG	GAT	GGG	GAC	ACC	CTG	CCA	GAC	CGG	AAG	AAT	TTT	GAC	2771
888	G	C	K	F	A	S	E	R	D	G	D	T	L	P	D	R	K	N	F	D	907
2772	TCC	TTG	CTC	TGG	GCC	ATC	GTC	ACT	GTC	TTT	CAG	ATC	CTG	ACC	CAG	GAG	GAC	TGG	AAC	AAA	2831
908	S	L	L	W	A	I	V	T	V	F	Q	I	L	T	Q	E	D	W	N	K	927
2832	GTC	CTC	TAC	AAT	GGT	ATG	GCC	TCC	ACG	TCG	TCC	TGG	GCG	GCC	CTT	TAT	TTC	ATT	GCC	CTC	2891
928	V	L	Y	N	G	M	A	S	T	S	S	W	A	A	L	Y	F	I	A	L	947
2892	ATG	ACC	TTC	GGC	AAC	TAC	GTG	CTC	TTC	AAT	TTG	CTG	GTC	GCC	ATT	CTG	GTG	GAG	GGC	TTC	2951



948	M	T	F	G	N	Y	V	L	F	N	L	L	V	A	I	L	V	E	G	F	967
2952	CAG	GCG	GAG	GAA	ATC	AGC	AAA	CGG	GAA	GAT	GCG	AGT	GGA	CAG	TTA	AGC	TGT	ATT	CAG	CTG	3011
968	Q	A	E	E	I	S	K	R	E	D	A	S	G	Q	L	S	C	I	Q	L	987
3012	CCT	GTC	GAC	TCC	CAG	GGG	GGA	GAT	GCC	AAC	AAG	TCC	GAA	TCA	GAG	CCC	GAT	TTC	TTC	TCA	3071
988	P	V	D	S	Q	G	G	D	A	N	K	S	E	S	E	P	D	F	F	S	1007
3072	CCC	AGC	CTG	GAT	GGT	GAT	GGG	GAC	AGG	AAG	AAG	TGC	TTG	GCC	TTG	GTG	TCC	CTG	GGA	GAG	3131
1008	P	S	L	D	G	D	G	D	R	K	K	C	L	A	L	V	S	L	G	E	1027
3132	CAC	CCG	GAG	CTG	CGG	AAG	AGC	CTG	CTG	CCG	CCT	CTC	ATC	ATC	CAC	ACG	GCC	GCC	ACA	CCC	3191
1028	H	P	E	L	R	K	S	L	L	P	P	L	I	I	H	T	A	A	T	P	1047
3192	ATG	TCG	CTG	CCC	AAG	AGC	ACC	AGC	ACG	GGC	CTG	GGC	GAG	GCG	CTG	GGC	CCT	GCG	TCG	CGC	3251
1048	M	S	L	P	K	S	T	S	T	G	L	G	E	A	L	G	P	A	S	R	1067
3252	CGC	ACC	AGC	AGC	AGC	GGG	TCG	GCA	GAG	CCT	GGG	GCG	GCC	CAC	GAG	ATG	AAG	TCA	CCG	CCC	3311
1068	R	T	S	S	S	G	S	A	E	P	G	A	A	H	E	M	K	S	P	P	1087
3312	AGC	GCC	CGC	AGC	TCT	CCG	CAC	AGC	CCC	TGG	AGC	GCT	GCA	AGC	AGC	TGG	ACC	AGC	AGG	CGC	3371
1088	S	A	R	S	S	P	H	S	P	W	S	A	A	S	S	W	T	S	R	R	1107
3372	TCC	AGC	CGG	AAC	AGC	CTC	GGC	CGT	GCA	CCC	AGC	CTG	AAG	CGG	AGA	AGC	CCA	AGT	GGA	GAG	3431
1108	S	S	R	N	S	L	G	R	A	P	S	L	K	R	R	S	P	S	G	E	1127
3432	CGG	CGG	TCC	CTG	TTG	TCG	GGA	GAA	GGC	CAG	GAG	AGC	CAG	GAT	GAA	GAG	GAG	AGC	TCA	GAA	3491
1128	R	R	S	L	L	S	G	E	G	Q	E	S	Q	D	E	E	E	S	S	E	1147
3492	GAG	GAG	CGG	GCC	AGC	CCT	GCG	GGC	AGT	GAC	CAT	CGC	CAC	AGG	GGG	TCC	CTG	GAG	CGG	GAG	3551
1148	E	E	R	A	S	P	A	G	S	D	H	R	H	R	G	S	L	E	R	E	1167
3552	GCC	AAG	AGT	TCC	TTT	GAC	CTG	CCA	GAC	ACA	CTG	CAG	GTG	CCA	GGG	CTG	CAT	CGC	ACT	GCC	3611
1168	A	K	S	S	F	D	L	P	D	T	L	Q	V	P	G	L	H	R	T	A	1187
3612	AGT	GGC	CGA	GGG	TCT	GCT	TCT	GAG	CAC	CAG	GAC	TGC	AAT	GGC	AAG	TCG	GCT	TCA	GGG	CGC	3671
1188	S	G	R	G	S	A	S	E	H	Q	D	C	N	G	K	S	A	S	G	R	1207
3672	CTG	GCC	CGG	GCC	CTG	CGG	CCT	GAT	GAC	CCC	CCA	CTG	GAT	GGG	GAT	GAC	GCC	GAT	GAC	GAG	3731
1208	L	A	R	A	L	R	P	D	D	P	P	L	D	G	D	D	A	D	D	E	1227
3732	GGC	AAC	CTG	AGC	AAA	GGG	GAA	CGG	GTC	CGC	GCG	TGG	ATC	CGA	GCC	CGA	CTC	CCT	GCC	TGC	3791
1228	G	N	L	S	K	G	E	R	V	R	A	W	I	R	A	R	L	P	A	C	1247
3792	TAC	CTC	GAG	CGA	GAC	TCC	TGG	TCA	GCC	TAC	ATC	TTC	CCT	CCT	CAG	TCC	AGG	TTC	CGC	CTC	3851
1248	Y	L	E	R	D	S	W	S	A	Y	I	F	P	P	Q	S	R	F	R	L	1267
3852	CTG	TGT	CAC	CGG	ATC	ATC	ACC	CAC	AAG	ATG	TTC	GAC	CAC	GTG	GTC	CTT	GTC	ATC	ATC	TTC	3911
1268	L	C	H	R	I	I	T	H	K	M	F	D	H	V	V	L	V	I	I	F	1287
3912	CTT	AAC	TGC	ATC	ACC	ATC	GCC	ATG	GAG	CGC	CCC	AAA	ATT	GAC	CCC	CAC	AGC	GCT	GAA	CGC	3971
1288	L	N	C	I	T	I	A	M	E	R	P	K	I	D	P	H	S	A	E	R	1307
3972	ATC	TTC	CTG	ACC	CTC	TCC	AAT	TAC	ATC	TTC	ACC	GCA	GTC	TTT	CTG	GCT	GAA	ATG	ACA	GTG	4031
1308	I	F	L	T	L	S	N	Y	I	F	T	A	V	F	L	A	E	M	T	V	1327
4032	AAG	GTG	GTG	GCA	CTG	GGC	TGG	TGC	TTC	GGG	GAG	CAG	GCG	TAC	CTG	CGG	AGC	AGT	TGG	AAC	4091
1328	K	V	V	A	L	G	W	C	F	G	E	Q	A	Y	L	R	S	S	W	N	1347
4092	GTG	CTG	GAC	GGG	CTG	TTG	GTG	CTC	ATC	TCC	GTC	ATC	GAC	ATT	CTG	GTG	TCC	ATG	GTC	TCT	4151
1348	V	L	D	G	L	L	V	L	I	S	V	I	D	I	L	V	S	M	V	S	1367
4152	GAC	AGC	GGC	ACC	AAG	ATC	CTG	GGC	ATG	CTG	AGG	GTG	CTG	CGG	CTG	CTG	CGG	ACC	CTG	CGC	4211
1368	D	S	G	T	K	I	L	G	M	L	R	V	L	R	L	L	R	T	L	R	1387
4212	CCG	CTC	AGG	GTG	ATC	AGC	CGG	GCG	CAG	GGG	CTG	AAG	CTG	GTG	GTG	GAG	ACG	CTG	ATG	TCC	4271
1388	P	L	R	V	I	S	R	A	Q	G	L	K	L	V	V	E	T	L	M	S	1407
4272	TCA	CTG	AAA	CCC	ATC	GGC	AAC	ATT	GTA	GTC	ATC	TGC	TGT	GCC	TTC	TTC	ATC	ATT	TTC	GGC	4331
1408	S	L	K	P	I	G	N	I	V	V	I	C	C	A	F	F	I	I	F	G	1427
4332	ATC	TTG	GGG	GTG	CAG	CTC	TTC	AAA	GGG	AAG	TTT	TTC	GTG	TGC	CAG	GGC	GAG	GAT	ACC	AGG	4391
1428	I	L	G	V	Q	L	F	K	G	K	F	F	V	C	Q	G	E	D	T	R	1447
4392	AAC	ATC	ACC	AAT	AAA	TCG	GAC	TGT	GCC	GAG	GCC	AGT	TAC	CGG	TGG	GTC	CGG	CAC	AAG	TAC	4451
1448	N	I	T	N	K	S	D	C	A	E	A	S	Y	R	W	V	R	H	K	Y	1467

FIG. 6C



4452 AAC TTT GAC AAC CTT GGC CAG GCC CTG ATG TCC CTG TTC GTT TTG GCC TCC AAG GAT GGT 4511
1468 N F D N L G Q A L M S L F V L A S K D G 1487

4512 TGG GTG GAC ATC ATG TAC GAT GGG CTG GAT GCT GTG GGC GTG GAC CAG CAG CCC ATC ATG 4571
1488 W V D I M Y D G L D A V G V D Q Q P I M 1507

4572 AAC CAC AAC CCC TGG ATG CTG CTG TAC TTC ATC TCG TTC CTG CTC ATT GTG GCC TTC TTT 4631
1508 N H N P W M L L Y F I S F L L I V A F F 1527

4632 GTC CTG AAC ATG TTT GTG GGT GTG GTG GTG GAG AAC TTC CAC AAG TGT AGG CAG CAC CAG 4691
1528 V L N M F V G V V V E N F H K C R Q H Q 1547

4692 GAG GAA GAG GAG GCC CGG CGG GAG GAG AAG CGC CTA CGA AGA CTG GAG AAA AAG AGA 4751
1548 E E E E A R R R E E K R L R R L E K K R 1567

4752 AGG AAA GCC CAG TGC AAA CCT TAC TAC TCC GAC TAC TCC CGC TTC CGG CTC CTC GTC CAC 4811
1568 R K A Q C K P Y Y S D Y S R F R L L V H 1587

4812 CAC TTG TGC ACC AGC CAC TAC CTG GAC CTC TTC ATC ACA GGT GTG ATC GGG CTG AAC GTG 4871
1588 H L C T S H Y L D L F I T G V I G L N V 1607

4872 GTC ACC ATG GCC ATG GAG CAC TAC CAG CAG CCC CAG ATT CTG GAT GAG GCT CTG AAG ATC 4931
1608 V T M A M E H Y Q Q P Q I L D E A L K I 1627

4932 TGC AAC TAC ATC TTC ACT GTC ATC TTT GTC TTG GAG TCA GTT TTC AAA CTT GTG GCC TTT 4991
1628 C N Y I F T V I F V L E S V F K L V A F 1647

4992 GGT TTC CGT CGG TTC TTC CAG GAC AGG TGG AAC CAG CTG GAC CTG GCC ATT GTG CTG CTG 5051
1648 G F R R F F Q D R W N Q L D L A I V L L 1667

5052 TCC ATC ATG GGC ATC ACG CTG GAG GAA ATC GAG GTC AAC GCC TCG CTG CCC ATC AAC CCC 5111
1668 S I M G I T L E E I E V N A S L P I N P 1687

5112 ACC ATC ATC CGC ATC ATG AGG GTG CTG CGC ATT GCC CGA GTG CTG AAG CTG CTG AAG ATG 5171
1688 T I I R I M R V L R I A R V L K L L K M 1707

5172 GCT GTG GGC ATG CGG GCG CTG CTG GAC ACG GTG ATG CAG GCC CTG CCC CAG GTG GGG AAC 5231
1708 A V G M R A L L D T V M Q A L P Q V G N 1727

5232 CTG GGA CTT CTC TTC ATG TTG TTG TTT TTC ATC TTT GCA GCT CTG GGC GTG GAG CTC TTT 5291
1728 L G L L F M L L F F I F A A L G V E L F 1747

5292 GGA GAC CTG GAG TGT GAC GAG ACA CAC CCC TGT GAG GGC CTG GGC CGT CAT GCC ACC TTT 5351
1748 G D L E C D E T H P C E G L G R H A T F 1767

5352 CGG AAC TTT GGC ATG GCC TTC CTA ACC CTC TTC CGA GTC TCC ACA GGT GAC AAT TGG AAT 5411
1768 R N F G M A F L T L F R V S T G D N W N 1787

5412 GGC ATT ATG AAG GAC ACC CTC CGG GAC TGT GAC CAG GAG TCC ACC TGC TAC AAC ACG GTC 5471
1788 G I M K D T L R D C D Q E S T C Y N T V 1807

5472 ATC TCG CCT ATC TAC TTT GTG TCC TTC GTG CTG ACG GCC CAG TTC GTG CTA GTC AAC GTG 5531
1808 I S P I Y F V S F V L T A Q F V L V N V 1827

5532 GTG ATC GCC GTG CTG ATG AAG CAC CTG GAG GAG AGC AAC AAG GAG GCC AAG GAG GAG GCC 5591
1828 V I A V L M K H L E E S N K E A K E E A 1847

5592 GAG CTA GAG GCT GAG CTG GAG CTG GAG ATG AAG ACC CTC AGC CCC CAG CCC CAC TCG CCA 5651
1848 E L E A E L E L E M K T L S P Q P H S P 1867

5652 CTG GGC AGC CCC TTC CTC TGG CCT GGG GTC GAG GGC CCC GAC AGC CCC GAC AGC CCC AAG 5711
1868 L G S P F L W P G V E G P D S P D S P K 1887

5712 CCT GGG GCT CTG CAC CCA GCG GCC CAC GCG AGA TCA GCC TCC CAC TTT TCC CTG GAG CAC 5771
1888 P G A L H P A A H A R S A S H F S L E H 1907

5772 CCC ACG ATG CAG CCC CAC CCC ACG GAG CTG CCA GGA CCA GAC TTA CTG ACT GTG CGG AAG 5831
1908 P T M Q P H P T E L P G P D L L T V R K 1927

5832 TCT GGG GTC AGC CGA ACG CAC TCT CTG CCC AAT GAC AGC TAC ATG TGT CGG CAT GGG AGC 5891
1928 S G V S R T H S L P N D S Y M C R H G S 1947

5892 ACT GCC GAG GGG CCC CTG GGA CAC AGG GGC TGG GGG CTC CCC AAA GCT CAG TCA GGC TCC 5951
1948 T A E G P L G H R G W G L P K A Q S G S 1967

FIG. 6D



5952	GTC	TTG	TCC	GTT	CAC	TCC	CAG	CCA	GCA	GAT	ACC	AGC	TAC	ATC	CTG	CAG	CTT	CCC	AAA	GAT	6011
1968	V	L	S	V	H	S	Q	P	A	D	T	S	Y	I	L	Q	L	P	K	D	1987
6012	GCA	CCT	CAT	CTG	CTC	CAG	CCC	CAC	AGC	GCC	CCA	ACC	TGG	GGC	ACC	ATC	CCC	AAA	CTG	CCC	6071
1988	A	P	H	L	L	Q	P	H	S	A	P	T	W	G	T	I	P	K	L	P	2007
6072	CCA	CCA	GGA	CGC	TCC	CCT	TTG	GCT	CAG	AGG	CCA	CTC	AGG	CGC	CAG	GCA	GCA	ATA	AGG	ACT	6131
2008	P	P	G	R	S	P	L	A	Q	R	P	L	R	R	Q	A	A	I	R	T	2027
6132	GAC	TCC	TTG	GAC	GTT	CAG	GGT	CTG	GGC	AGC	CGG	GAA	GAC	CTG	CTG	GCA	GAG	GTG	AGT	GGG	6191
2028	D	S	L	D	V	Q	G	L	G	S	R	E	D	L	L	A	E	V	S	G	2047
6192	CCC	TCC	CCG	CCC	CTG	GCC	CGG	GCC	TAC	TCT	TTC	TGG	GGC	CAG	TCA	AGT	ACC	CAG	GCA	CAG	6251
2048	P	S	P	P	L	A	R	A	Y	S	F	W	G	Q	S	S	T	Q	A	Q	2067
6252	CAG	CAC	TCC	CGC	AGC	CAC	AGC	AAG	ATC	TCC	AAG	CAC	ATG	ACC	CCG	CCA	GCC	CCT	TGC	CCA	6311
2068	Q	H	S	R	S	H	S	K	I	S	K	H	M	T	P	P	A	P	C	P	2087
6312	GGC	CCA	GAA	CCC	AAC	TGG	GGC	AAG	GGC	CCT	CCA	GAG	ACC	AGA	AGC	AGC	TTA	GAG	TTG	GAC	6371
2088	G	P	E	P	N	W	G	K	G	P	P	E	T	R	S	S	L	E	L	D	2107
6372	ACG	GAG	CTG	AGC	TGG	ATT	TCA	GGA	GAC	CTC	CTG	CCC	CCT	GGC	GGC	CAG	GAG	GAG	CCC	CCA	6431
2108	T	E	L	S	W	I	S	G	D	L	L	P	P	G	G	Q	E	E	P	P	2127
6432	TCC	CCA	CGG	GAC	CTG	AAG	AAG	TGC	TAC	AGC	GTG	GAG	GCC	CAG	AGC	TGC	CAG	CGC	CGG	CCT	6491
2128	S	P	R	D	L	K	K	C	Y	S	V	E	A	Q	S	C	Q	R	R	P	2147
6492	ACG	TCC	TGG	CTG	GAT	GAG	CAG	AGG	AGA	CAC	TCT	ATC	GCC	GTC	AGC	TGC	CTG	GAC	AGC	GGC	6551
2148	T	S	W	L	D	E	Q	R	R	H	S	I	A	V	S	C	L	D	S	G	2167
6552	TCC	CAA	CCC	CAC	CTG	GGC	ACA	GAC	CCC	TCT	AAC	CTT	GGG	GGC	CAG	CCT	CTT	GGG	GGG	CCT	6611
2168	S	Q	P	H	L	G	T	D	P	S	N	L	G	G	Q	P	L	G	G	P	2187
6612	GGG	AGC	CGG	CCC	AAG	AAA	AAA	CTC	AGC	CCG	CCT	AGT	ATC	ACC	ATA	GAC	CCC	CCC	GAG	AGC	6671
2188	G	S	R	P	K	K	K	L	S	P	P	S	I	T	I	D	P	P	E	S	2207
6672	CAA	GGT	CCT	CGG	ACC	CCG	CCC	AGC	CCT	GGT	ATC	TGC	CTC	CGG	AGG	AGG	GCT	CCG	TCC	AGC	6731
2208	Q	G	P	R	T	P	P	S	P	G	I	C	L	R	R	R	A	P	S	S	2227
6732	GAC	TCC	AAG	GAT	CCC	TTG	GCC	TCT	GGC	CCC	CCT	GAC	AGC	ATG	GCT	GCC	TCG	CCC	TCC	CCA	6791
2228	D	S	K	D	P	L	A	S	G	P	P	D	S	M	A	A	S	P	S	P	2247
6792	AAG	AAA	GAT	GTG	CTG	AGT	CTC	TCC	GGT	TTA	TCC	TCT	GAC	CCA	GCA	GAC	CTG	GAC	CCC	TGA	6851
2248	K	K	D	V	L	S	L	S	G	L	S	S	D	P	A	D	L	D	P	*	2267
6852	gtcctgccccacttttcccactcaccttttctccactgggtgc																				6892



COMPARISON OF P-REGIONS

I		II		III		IV		
LAASE E	GWVYV	QIITQ E	GWTDV	ETLSF K	GWNVV	RCLTG E	DWNDI (seq id no: 38)	NIC-1 (C11D2.6)
LAASQ E	GWVYV	QIITQ E	GWTDV	ETLSY K	GWNVV	RSVTG E	DWNDI (seq id no: 39)	NIC-2 (C27F2.3)
EASSQ E	GWVFL	QILTQ E	GWVDV	EVLSL K	GWVEV	RIVTG E	DWVKI (seq id no: 40)	Rat-NIC
QCITM E	GWTDV	QILTQ E	DWNSV	TVSTF E	GWPEL	RCATG E	AWQDI (seq id no: 41)	L-Type Ca Channel
QVITL E	GWVDI	QILTQ E	DWNVV	VLASK D	GWVDI	RVSTG D	NWNGI (seq id no: 42)	T-Type Ca Channel
RLMTQ D	FWENL	RVLCG E	WIETM	QVATF K	GWMDI	QITTS A	GWGGL (seq id no: 43)	Na Channels

Fig. 8